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**Sanborn**

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(54) **MOUNTING APPARATUS FOR LIGHTING AND LIGHTING ACCESSORIES**

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362/404; 248/229.1; 248/229.15; 248/229.2;  
248/231.21

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52/39, 173.1, 28; 248/229.15, 231.21, 231.71,  
248/229.1, 229.2, 229.25, 229.26, 229.16;  
362/148, 404

See application file for complete search history.

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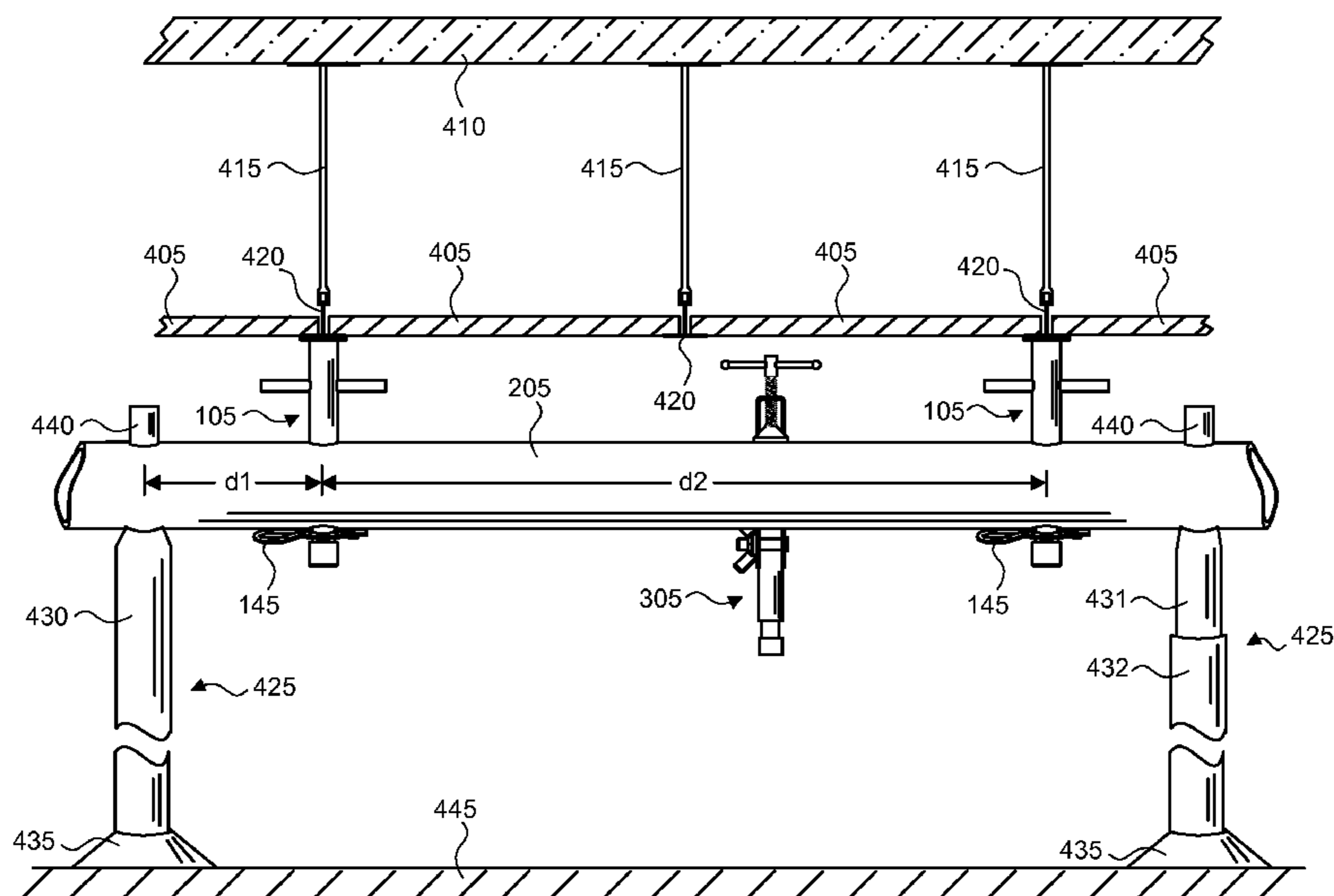
*Assistant Examiner*—Jessie Fonseca

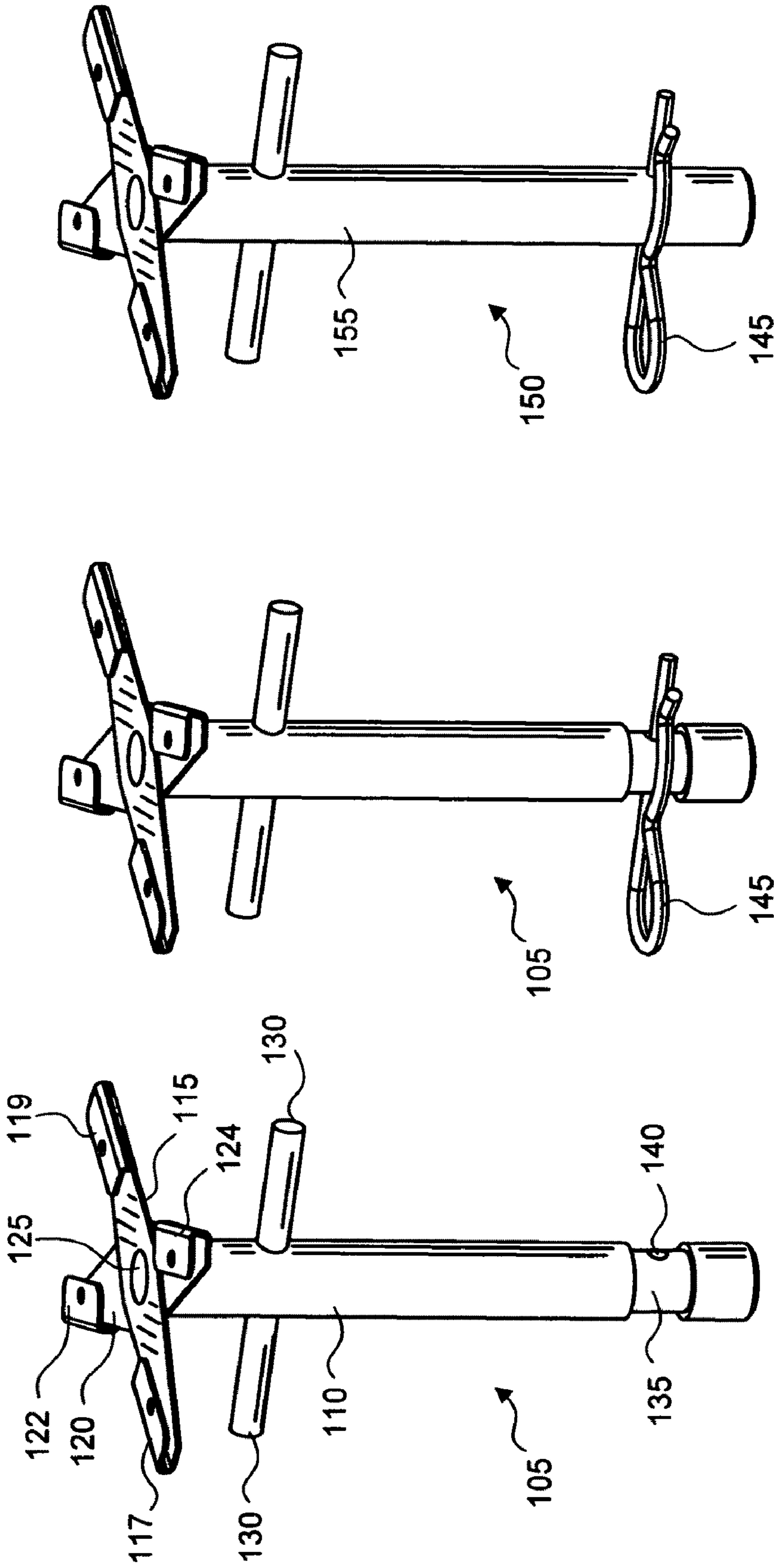
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(57) **ABSTRACT**

Embodiments of the invention provide a mounting apparatus that includes at least two ceiling mounts. Each of two scissor mounts may be coupled to the same or different dropped ceiling rail(s) using a corresponding scissor clip feature. The mounting apparatus further includes a mounting pipe that is coupled to each of the scissor mounts. The mounting pipe is thus suspended by the scissor mounts below the dropped ceiling, providing an unlimited number of potential mounting positions for lighting and/or lighting accessories.

**15 Claims, 5 Drawing Sheets**





**FIG. 1A**

**FIG. 1B**

**FIG. 1C**

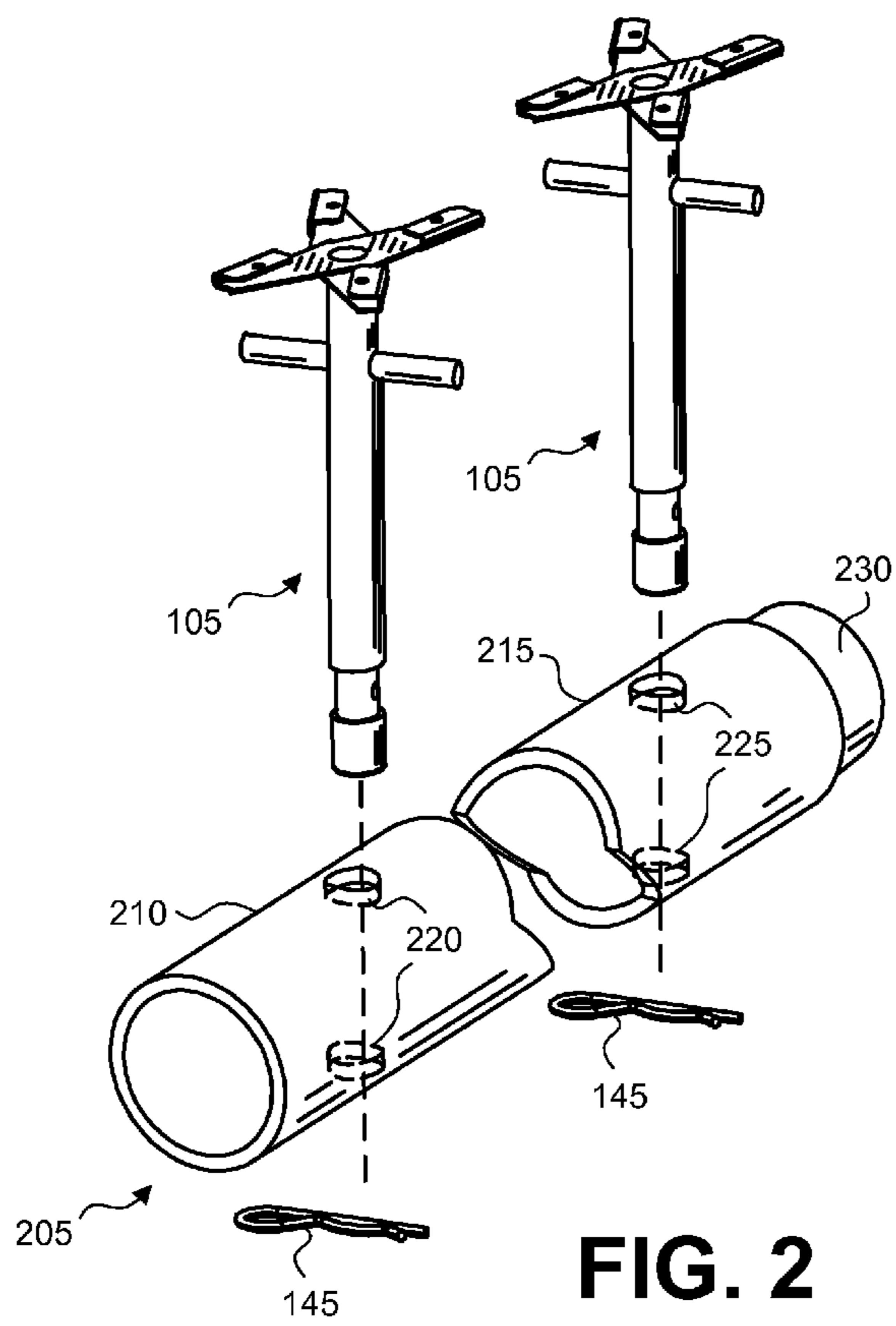


FIG. 2

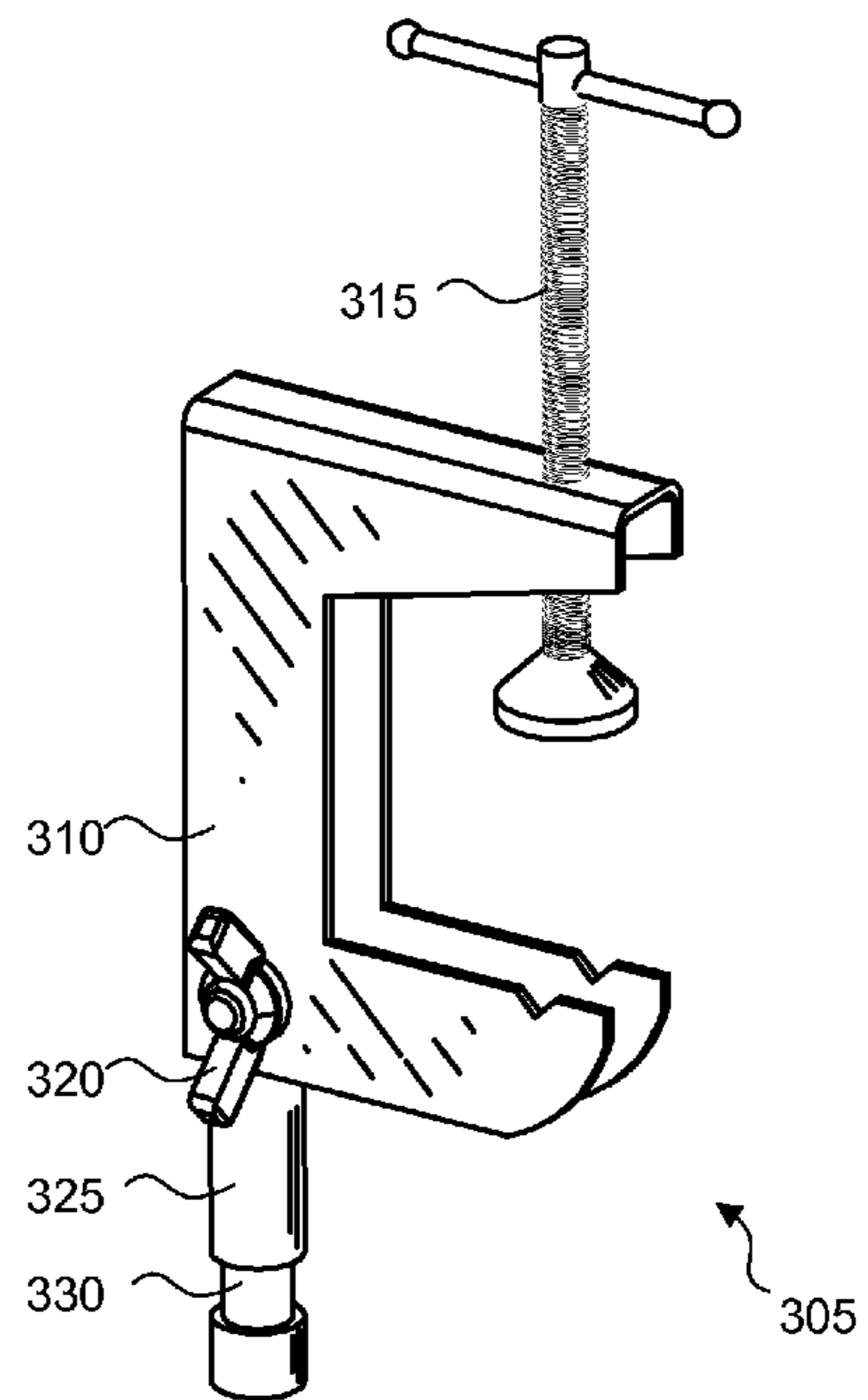


FIG. 3

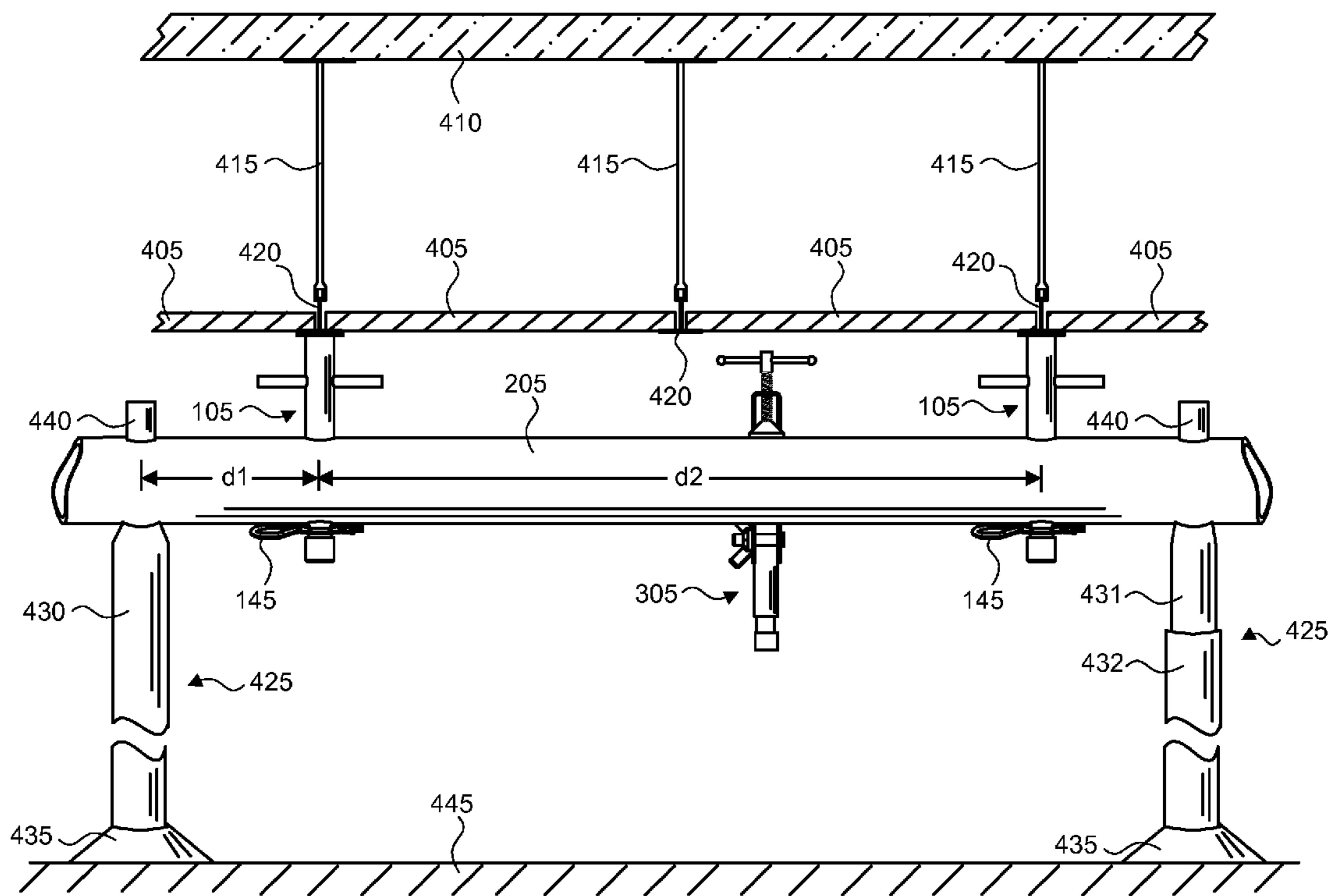


FIG. 4A

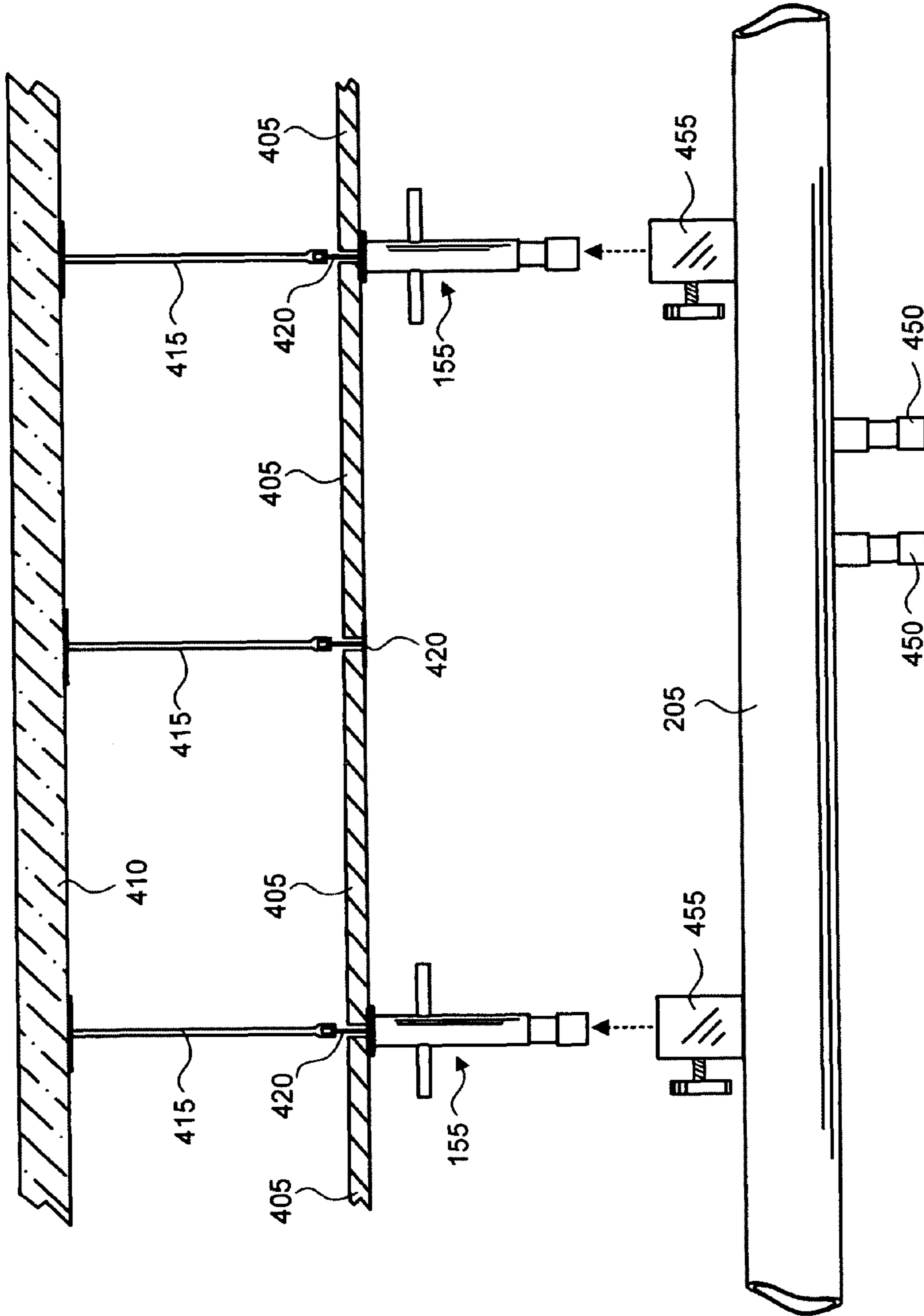


FIG. 4B



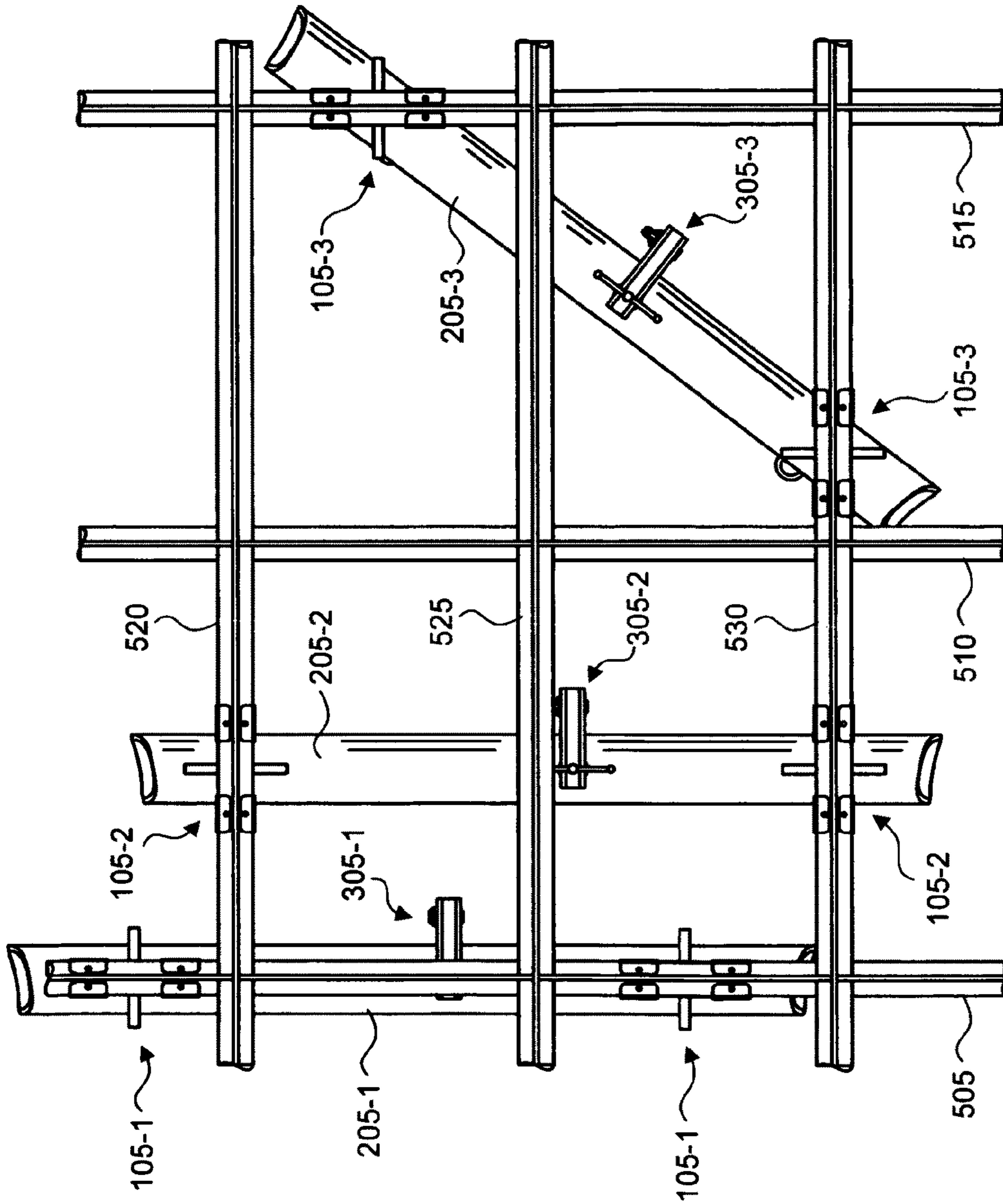


FIG. 5

## MOUNTING APPARATUS FOR LIGHTING AND LIGHTING ACCESSORIES

### BACKGROUND AND SUMMARY

#### 1. Field of the Invention

The invention relates generally to a mounting apparatus, and more particularly, but without limitation, to a mounting apparatus for lighting and lighting accessories that is configured to attach to dropped ceiling rails.

#### 2. Description of the Related Art

Frequently, a photographer or videographer will capture images on location rather than in studio. Location shoots present many challenges for the photographer or videographer. One challenge is finding adequate mounting areas for lighting (lamps) and lighting accessories (e.g., reflectors, umbrellas, and flags).

Many indoor locations include dropped ceilings (a/k/a drop ceilings or suspended ceilings). Such ceilings include an array of panels (or tiles) supported by rails (a/k/a runners, tracks, or beams). Typically, the panels are square. For instance, the panels may be 2 ft square or 600 mm square. Rectangular panels measuring 2 ft×4 ft are also common.

Known mounting devices attach to the rails for the purpose of at least temporarily mounting lighting and/or lighting accessories below the dropped ceiling. Examples include the scissor clip described in U.S. Pat. No. 3,018,080 and the ceiling hook disclosed in U.S. Pat. No. 4,112,550. Both devices can be quickly and easily installed, and their use does not require permanent alteration of (or damage to) the rails.

The scissor clip and ceiling hook described in the foregoing references have many disadvantages, however. For instance, a drawback is that each device only provides a single mounting area. Additionally, the scissor clip and ceiling hook constrain the available mounting positions to those that are directly aligned with the rails of the dropped ceiling.

A portable mounting apparatus is needed that can provide greater flexibility in where a photographer or videographer can mount lighting and lighting accessories.

### SUMMARY OF THE INVENTION

Embodiments of the invention seek to overcome one or more of the aforementioned limitations by providing a mounting apparatus that includes at least two ceiling mounts. In an embodiment of the invention, each of two scissor mounts are coupled to the same or different dropped ceiling rail(s) using a corresponding scissor clip feature. The mounting apparatus further includes a mounting pipe that is coupled to each of the scissor mounts. The mounting pipe is thus suspended by the scissor mounts below the dropped ceiling, providing an unlimited number of potential mounting positions for lighting and/or lighting accessories.

An embodiment of the invention provides a mounting apparatus that includes: at least two scissor mounts, each of the at least two scissor mounts having: a scissor clip, the scissor clip configured to couple to a rail of a dropped ceiling; and a shaft coupled to the scissor clip at a first end of the shaft; a pipe coupled to each of the at least two scissor mounts, a long axis of the pipe being substantially orthogonal to a long

axis of the shaft; and a first male connector coupled to the pipe and configured to receive one of a lighting fixture and a lighting accessory.

### BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be more fully understood from the detailed description below and the accompanying drawings, wherein:

FIG. 1A is a perspective view of a scissor mount, according to an embodiment of the invention;

FIG. 1B is a perspective view of a scissor mount and cotter pin, according to an embodiment of the invention;

FIG. 1C is a perspective view of a scissor mount and cotter pin, according to an embodiment of the invention;

FIG. 2 is an exploded perspective view of a pipe assembly, according to an embodiment of the invention;

FIG. 3 is a perspective view of a c-clamp, according to an embodiment of the invention;

FIG. 4A is an elevation view of a mounting apparatus, according to an embodiment of the invention;

FIG. 4B is an elevation view of a mounting apparatus, according to an embodiment of the invention; and

FIG. 5 is a top plan view of multiple mounting apparatuses, according to an embodiment of the invention.

### DETAILED DESCRIPTION

Embodiments of the invention now will be described more fully with reference to FIGS. 1A through 5, in which embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete.

FIG. 1A is a perspective view of a scissor mount, according to an embodiment of the invention. As illustrated therein, a scissor mount **105** includes a shaft **110**. The shaft **110** may be manufactured, for example, from solid aluminum round bar stock.

On a top end of the scissor mount **105**, a scissor clip is formed by an arm **115** and an arm **120** that rotate about a pivot point **125**. The arm **115** includes flanges **117** and **119** extending upward and inward from opposite ends and sides of the arm **115**. The arm **120** includes flanges **122** and **124** extending upward and inward from opposite ends and sides of the arm **120**. The scissor clip is configured such that it can be locked in a closed position, communicating with a dropped ceiling rail on interior surfaces of the flanges **117**, **119**, **122**, and **124**. The scissor mount **105** may further include a handle **130**. The handle **130** may be manufactured, for example, from solid aluminum round bar stock. In operation, the handle **130** may be used to rotate the shaft **110** for the purpose of loosening or tightening the scissor clip. U.S. Pat. No. 3,018,080, issued Jan. 23, 1962, is hereby incorporated by reference in its entirety for its disclosure of the scissor clip mechanism.

A bottom portion of the shaft **110** may include a reduced-diameter portion **135** that forms a male stud connector on the bottom portion of the shaft **110**. The shaft **110** may further include a through-hole **140** in the bottom portion of the shaft **110**, although the through-hole **140** does not necessarily have to pass through the reduced-diameter portion **135**.

FIG. 1B is a perspective view of a scissor mount and cotter pin, according to an embodiment of the invention. FIG. 1B illustrates that the through-hole **140** of the scissor mount **105**



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is configured to receive a cotter pin **145**. The purpose of the cotter pin **145** will be described below with reference to FIGS. **2** and **4**.

FIG. **1C** is a perspective view of a scissor mount and cotter pin, according to an embodiment of the invention. FIG. **1C** illustrates a scissor mount **150** that is substantially similar to the scissor mount **105** illustrated and described above with reference to FIGS. **1A** and **1B**, except that the scissor mount **150** does not include the reduced diameter area **135** or the associated male connector. FIG. **1C** also illustrates that the through-hole **140** of the scissor mount **150** is configured to receive the cotter pin **145**.

Variations to the scissor mounts **105** and **150** are also possible. For instance, the materials and proportions of the scissor mounts **105** and **150** could be varied, according to design choice. Moreover, in alternative embodiments, the handle **130** could be omitted.

FIG. **2** is an exploded perspective view of a pipe assembly, according to an embodiment of the invention. The illustrated pipe assembly includes a pipe **205**. The pipe **205** may be, for example, a hollow aluminum tube. The long dimension of the pipe **205** could be, for instance, 6 or 10 ft, and the pipe **205** could have an outside diameter of approx.  $1\frac{5}{16}$  inches, although the scope of the invention is not limited to these exemplary dimensions. A first portion **210** of the pipe **205** includes a pair of opposing through-holes **220**; a second portion **215** of the pipe **205** includes a pair of opposing through-holes **225**. Each pair of through-holes **220** and **225** is configured to receive the shaft **110** of a scissor mount **105**. The pipe **205** is retained on the pair of scissor mounts **105** by the cotter pins **145**.

Variations to the pipe assembly illustrated in FIG. **2** and described above are possible. For example, the pipe **205** may be constructed of iron, plastic, wood, carbon fiber, titanium, or other suitable material. In alternative embodiments, the pipe **205** could be solid rather than hollow. Furthermore, the pipe **205** may be configured with more than two pairs of through-holes to accept more than two scissor mounts **105** and/or other components.

In yet another embodiment, the pipe **205** could be telescopic to enhance portability. For instance, the pipe **205** could be 4 ft long in its most compressed configuration, but 7 ft long when fully extended. Because different portions of a telescoping pipe **205** may overlap, there may be a discrete number of adjustable lengths that could be accommodated (to account for overlap of the through-hole pairs). The optional telescope feature of the pipe **205** is illustrated in FIG. **2** by the pipe portion **230** that is configured to cooperate with the pipe portion **215**.

FIG. **3** is a perspective view of a c-clamp, according to an embodiment of the invention. As shown therein, the c-clamp **305** includes a c-shaped frame **310**. The frame **310** may be manufactured from steel, cast iron, aluminum, or other suitable material. A special-purpose screw **315** threads through a first portion of the frame **310** to provide clamping action between a flat end of the special-purpose screw **315** and a second portion of the frame **310**. A shaft **325** coupled to the frame **310** may include a reduced diameter portion **330** to form a male stud connector on a bottom end of the shaft **325**. A wing nut assembly **320** may also be attached to the frame **310** to facilitate the attachment of flags or other lighting accessories.

FIG. **4A** is an elevation view of a mounting apparatus, according to an embodiment of the invention. In FIG. **4A**, a structural deck **410**, panels **405**, and a floor **445** are illustrated in cross-section. The structural deck **410** may be or include,

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for instance, a joist, ceiling, or other architectural features that can provide adequate support for a dropped ceiling.

The dropped ceiling includes the panels **405**, which are suspended from the structural deck **410** via cables **415** and rails **420**. The panels **405** may be constructed of plastic, wood, metal, fiber board, or other suitable material. In an alternative embodiment, the cables **415** may be substituted by rods (not shown). Typically, the rails **420** have an inverted T cross-section (as illustrated). The cables **415**, rods (not shown), and rails **420** may be metal, plastic, or other suitable material, according to design choice.

The mounting apparatus may include components already described herein. Accordingly, in the illustrated embodiment, the mounting apparatus includes a pipe **205** that is coupled to two scissor mounts **105** with cotter pins **145**, as described above with reference to FIG. **2**. Each of the two scissor mounts **105** is attached to a respective rail **420** via the scissor clip feature. As shown, the mounting apparatus also includes a c-clamp **305** coupled to the pipe **205** to accommodate lighting and/or lighting accessories that are compatible with the male stud connector of the c-clamp **305**.

In the illustrated embodiment, the mounting apparatus further includes two poles **425**. Each of the two poles **425** is optional, and any number of poles **425** could be used. One benefit of the poles **425** is additional support for the weight of the pipe **205** and the lighting and/or lighting accessories that could be mounted to the pipe **205**. The poles **425** could also provide additional mounting locations for lighting and/or lighting accessories. Each of the two poles **425** illustrated in FIG. **4A** includes a tubular body **430** or **431/432**. The tubular body **430** or **431/432** tapers to a reduced diameter tip **440** at one end, and terminates into a foot **435** at an opposite end. As illustrated in FIG. **4A**, the pole **425** may include a first tubular body portion **431** that is configured to cooperate with a second tubular body portion **432** to provide telescopic adjustment between the pipe **205** and the floor **445**. Preferably, the reduced diameter tip **440** of the pole **425** is configured to communicate with the same diameter through-hole pairs in the pipe **205** as the scissor mounts **105** and/or **150**. The foot **435** may be or include, rubber, for example, to provide friction with the surface of the floor **445**.

Variations to the mounting apparatus illustrated in FIG. **4A** are possible. For instance, the pipe **205** could include more than the **4** illustrated pairs of through-holes, and the positioning of each through-hole pair is not constrained by the exemplary dimensions **d1** and **d2**. Indeed, for some applications, it may be preferable that the through-hole pairs in the pipe **205** are spaced at regular intervals that are approximately equal to spacing between the rails **420**.

More than two scissor mounts **105** could be used with the pipe **205**. It may be advantageous in some cases to include more scissor mounts **105** per unit length of the pipe **205** to improve the weight-bearing ability of the mounting apparatus. In an alternative embodiment, one or more scissor mounts **150**, and/or other dropped ceiling mounts not disclosed herein could be used to suspend the pipe **205** from the rails **420**.

Fasteners other than cotter pins **145** could be used to fasten the pipe **205** to the scissor mounts **105**, **150**, or other ceiling mounts. For example, nuts and bolts could be used in place of the cotter pins **145**.

The placement of a single c-clamp **305** in FIG. **4A** is merely illustrative. Multiple c-clamps **305** could be affixed to the pipe **205**. In the alternative, or in combination, one or more other pieces of mounting hardware could be coupled to the pipe **205** to facilitate the attachment of lighting and/or lighting accessories to the pipe **205**.



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FIG. 4B is an elevation view of a mounting apparatus, according to an embodiment of the invention. The embodiment illustrated in FIG. 4B is substantially similar to mounting apparatus configuration illustrated in FIG. 4A, except as described below.

In FIG. 4B, male connectors **450** are directly attached to the pipe **205**. One or more directly-attached male connectors **450** could therefore be used alone or in combination with one or more c-clamps **305** to mount lighting and/or lighting accessories to the mounting apparatus.

FIG. 4B also illustrates scissor mounts **155**. Scissor mounts **155** are substantially similar to the scissor mounts **105**, except that scissor mounts **155** lack a through-hole **140**. In the illustrated embodiment, the pipe **205** includes two female connectors **455** that are configured to mate with corresponding male connectors located on an end of each scissor mount **155**. FIG. 4B thus shows a coupling technique that can be used in the alternative to the cotter pin retaining scheme illustrated in FIGS. 2 and 4A.

FIG. 5 is a top plan view of multiple mounting apparatuses, according to an embodiment of the invention. For clarity, cables **415** and panels **405** are not shown. The only dropped ceiling features shown in FIG. 5 are rails **505**, **510**, **515**, **520**, **525**, and **530**. More specifically, rails **505**, **510**, and **515** are substantially parallel to each other and extend in a first direction. Rails **520**, **525**, and **530** are substantially parallel to each other and extend in a second direction. The first direction is substantially orthogonal to the second direction, as is typical in dropped ceiling installations. Together, the rails **505**, **510**, **515**, **520**, **525**, and **530** represent at least a portion of a dropped ceiling rail grid.

FIG. 5 further illustrates at least portions of three mounting apparatuses that are coupled to the rail grid. Each of the mounting apparatuses is attached to the rail grid in a unique fashion. A first mounting apparatus includes a pipe **205-1**, two scissor mounts **105-1**, and a c-clamp **305-1**. The first mounting apparatus is coupled to a single rail **505**. A second mounting apparatus includes a pipe **205-2**, two scissor mounts **105-2**, and a c-clamp **305-2**. The second mounting apparatus is coupled to parallel rails **520** and **530**, similar to the configurations in FIGS. 4A and 4B. A third mounting apparatus includes a pipe **205-3**, two scissor mounts **105-3**, and a c-clamp **305-3**. The third mounting apparatus is coupled to orthogonal rails **515** and **530**. The alternative couplings illustrated in FIG. 5 thus underscore the flexibility in attaching one or more of the disclosed mounting apparatuses to a rail grid of a dropped ceiling.

Each of the possible variations discussed with reference to the mounting apparatus in FIGS. 4A and 4B are also possible, separately or in combination, with respect to each of the mounting apparatuses depicted in FIG. 5.

It will be apparent to those skilled in the art that additional modifications and variations can be made without deviating from the spirit or scope of the invention. For example, a mounting apparatus could be formed using two or more devices disclosed herein in combinations that are not expressly illustrated or otherwise disclosed. Moreover, any combination of devices described herein could be included in a kit for later assembly into a mounting apparatus at a remote location. It is intended that the invention cover any such modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

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What is claimed is:

1. A mounting apparatus comprising:

at least two scissor mounts, each of the at least two scissor mounts having:

a scissor clip, the scissor clip configured to couple to a rail of a dropped ceiling; and

a shaft coupled to the scissor clip at a first end of the shaft;

a pipe coupled to each of the at least two scissor mounts, a long axis of the pipe being substantially orthogonal to a long axis of the shaft, the pipe including at least two pairs of opposing through-holes, each of the at least two pairs of opposing through-holes configured to receive the shaft of a corresponding one of the at least two scissor mounts;

a first male connector coupled to the pipe and configured to receive one of a lighting fixture and a lighting accessory; and

at least two cotter pins, the shaft including a through-hole at a second end of the shaft, the through-hole configured to receive a corresponding one of the at least two cotter pins, the at least two cotter pins thus configured to retain the pipe on the shaft of each of the at least two scissor mounts.

2. The mounting apparatus of claim 1, wherein the pipe is constructed of aluminum.

3. The mounting apparatus of claim 1, wherein the pipe is telescopic.

4. The mounting apparatus of claim 1, further comprising a c-clamp clamped to the pipe, the first male connector being a portion of the c-clamp.

5. The mounting apparatus of claim 1, wherein the first male connector is directly affixed to the pipe.

6. The mounting apparatus of claim 5, further comprising a c-clamp clamped to the pipe, the c-clamp having a second male connector.

7. The mounting apparatus of claim 1, further comprising at least one pole coupled between the pipe and a floor.

8. The mounting apparatus of claim 7, wherein the at least one pole includes a reduced-diameter tip with respect to a body of the pole, the reduced-diameter tip being in direct communication with the pipe.

9. The mounting apparatus of claim 8, wherein the reduced-diameter tip has substantially the same diameter as the shaft.

10. The mounting apparatus of claim 7, wherein the at least one pole includes a rubber foot, the rubber foot being in direct communication with a surface of the floor.

11. The mounting apparatus of claim 7, wherein the at least one pole is telescopic.

12. The mounting apparatus of claim 1, wherein two of the at least two scissor mounts are coupled to the same rail of the dropped ceiling.

13. The mounting apparatus of claim 1, wherein a first one of the at least two scissor mounts is coupled to a first rail of the dropped ceiling, a second one of the at least two scissor mounts is coupled to a second rail of the dropped ceiling, the first rail being substantially parallel to the second rail.

14. The mounting apparatus of claim 1, wherein a first one of the at least two scissor mounts is coupled to a first rail of the dropped ceiling, a second one of the at least two scissor mounts is coupled to a second rail of a dropped ceiling, the first rail being substantially orthogonal to the second rail.

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**15.** A lighting system comprising:  
a first mounting apparatus as claimed in claim 1;  
a dropped ceiling rail grid coupled to the first mounting  
apparatus; and

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a second mounting apparatus as claimed in claim 1, the  
second mounting apparatus coupled to the dropped ceiling  
rail grid.

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